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REMARKS

Claims 1-20 are pending. Claims 14 and 18 have been objected to as containing allowable subject matter but being based on a rejected claim. Claim 1 has been amended, the new subject matter being supported by Figures 5 and 6. It is respectfully submitted that no new matter has been added.

The Patent Office rejected claims 1-12 under 35 U.S.C. 101 allegedly because the claimed invention is directed to non-statutory subject matter. The Patent Office asserted that the current state of the claim language is such that a reasonable interpretation of the claims would not result in any useful, concrete or tangible product and that selecting a macromodel in order to simulate a transmission line does not result in a tangible output.

The amendment to claim 1 is believed to overcome the 35 U.S.C. 101 rejection. It is respectfully requested that the Patent Office withdraw its rejection of claims 1-12 under 35 U.S.C. 101.

Applicant requests guidance from the Patent Office in language that might overcome the 35 U.S.C. 101 rejection if the proposed amendment does not do so.

The Patent Office rejected claims 1-13, 15-17, 19, and 20 under 35 U.S.C. 103(a) as being unpatentable over Elfadel, "A Comparative Study of Two Transient Analysis Algorithms for Lossy Transmission Lines with Frequency-Dependent Data," and Roychowdhury, "Automated Macromodel Generation for Electronic Systems."

Claim 1 recites

A computer modeling system comprising: a processor that has at least one input that receives parameters related to one or more electrical transmission lines, the parameters representing one or more physical characteristics and one or more electrical characteristics of the one or more electrical transmission lines; a database with a set of one or more macromodels that in which the processor is arranged to apply the parameters in a simulation to determine an electrical behavior of one or more of the electrical transmission lines; and **an automatic selection process controlled by the processor that selects a macromodel from the set of macromodels to simulate one or more of the electrical transmission lines, the selection of the macromodel being determined by one of comparing a total distortion to an error threshold and comparing a length of the transmission line to a critical length calculated from the parameters, wherein the processor provides a**

generated transmission line macromodel corresponding to the selected macromodel to an electrical circuit simulator program.

Claim 13 recites

A signal bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform operations to automatically select a macromodel from a set of macromodels for use in **simulating a transmission line**, the operations comprising: providing input parameters of per-unit-length resistance (R), per-unit-length inductance (L), per-unit-length conductance (G), per-unit-length capacitance (C), length (d), and maximum operating frequency (ω_{max}); computing total distortion (Δ_T) from the input parameters; providing an error threshold (ϵ); comparing the total distortion with the error threshold; **automatically selecting a macromodel based upon whether the total distortion is more or less than the error threshold.**

Claim 17 recites

A signal bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform operations to automatically select a macromodel from a set of macromodels for use in **simulating a transmission line**, the operations comprising: providing input parameters of per-unit-length resistance (R), per-unit-length capacitance (C), length (d), and maximum operating frequency (ω_{max}), and error threshold (ϵ); computing a critical length ($d_{critical}$) from the input parameters; comparing the length of the transmission line with the critical length; **automatically selecting a macromodel based upon whether the length of the transmission line is less than or greater than the critical length.**

Elfadel discloses two general algorithms for the modeling of lossy transmission lines with frequency dependent parameters. One of the two general algorithms belongs to the class of the generalized method of characteristics (MoC) where the main idea is to represent the transmission line with a set of admittances and delayed sources representing the terminal behavior. The other general algorithm incorporates sectioning. Elfadel compares and contrasts these two general algorithms but does not disclose or suggest that the general algorithms are selected in a computer modeling system or through a signal bearing medium.

The automated macromodel generation process in Roychowdhury discloses lumped-

parameter circuits (made of discrete components) rather than transmission lines (i.e., distributed-parameter circuits) as disclosed in Applicant's application. The prior art does not teach how to automate the generation of a transmission line macromodel.

The distortion mentioned in Roychowdhury refers to lumped-parameter communication circuitry and its calculation requires the analysis of the circuit using a circuit analysis program such as SPICE. The distortion disclosed by applicant pertains to transmission lines (i.e., distributed circuits) and is computed prior to circuit analysis.

Applicant's invention is based on a novel mathematical system that is not found in Elfadel or Roychowdhury (please see at least the equations 3-11 of Applicant's disclosure). These equations are not obvious to one of ordinary skill in the art.

Neither Elfadel nor Roychowdhury, alone or in combination, teaches how to use the total distortion of a multiconductor transmission line or a critical length as a criterion for the selection of a macromodel for transmission lines.

Claim 13 recites **"automatically selecting a macromodel based upon whether the total distortion is more or less than the error threshold."**

The Patent Office admits on page 10 of the Final Office Action dated February 22, 2007, that Elfadel does not explicitly disclose computing total distortion. Contrary to the Patent Office's assertion of that page, whereas Roychowdhury, on page 15, right hand column, discloses that the Trajectory PWL method has a limited ability to reproduce small-signal distortion and that the piecewise polynomial extension of TPWL method is able to capture small-signal distortion. Roychowdhury does not disclose or suggest the selection of the macromodel being determined by comparing a total distortion against an error threshold, comparing a total distortion against an error threshold, or a total distortion.

The Patent Office, on page 10 of the Final Office Action dated February 22, 2007, refers to page 1 of Applicant's disclosure in which interconnections between system components are discussed, but there is no disclosure of total distortion being computed or compared.

Accordingly, claims 13-16 are allowable over the prior art of record.

Claim 1 recites **"the selection of the macromodel being determined by one of comparing a total distortion to an error threshold and comparing a length of the transmission line to a critical length calculated from the parameters."**

Claim 17 recites “**automatically selecting a macromodel based upon whether the length of the transmission line is less than or greater than the critical length.**”

The Patent Office asserts on page 11 of the Final Office Action dated February 22, 2007, that Elfadel discloses computing a critical length from the input parameters and comparing the length of the transmission line with the critical length to generate a macromodel (page 145 right hand column). Elfadel, on page 145, right hand column, discloses tradeoffs between the length d , the number of segments m , and the order N for a given set of frequency-dependent per-unit length (FDPUL) parameters have to be determined automatically to ensure robustness and accuracy for the Method of Matrix Pade Approximations. There is no disclosure or suggestion, at least in this portion of Elfadel, of “**automatically selecting a macromodel based upon whether the length of the transmission line is less than or greater than the critical length.**”

Thus, claims 1-12 and 17-20 are allowable over the prior art of record.

Response to Certain Arguments Presented in the Final Office Action dated February 22, 2007

Particular attention is paid to the Patent Office’s comments on page 4, lines 3-12, of the Final Office Action dated February 22, 2007, reproduced below as follows:

- vi. Applicant submits, on page 8, that Applicant’s background of the invention does not disclose an error threshold and does not disclose automatically selecting a macromodel based on whether the total distortion is more or less than the error threshold. The Examiner notes that the Background of the specification is not relied upon for this limitation. As per the previous Office Action, the Examiner maintains that Roychowdhury discloses distortion (Roychowdhury: page 15 right hand column) and that a skilled artisan would have knowingly used an error threshold (i.e. input the acceptable values into the system).
- vii. Applicant submits, on page 9, that neither Elfadel nor Roychowdhury disclose a critical length. The previously cited portion of the Elfadel reference discloses incorporating the length of the line into the analysis. Elfadel further discloses minimizing the length of the line (i.e. reaching a critical length) to improve the accuracy of the approximation (section III 2nd paragraph).

Regarding point vi, Roychowdhury, as discussed above, does not disclose comparing total distortion to a threshold.

Regarding point vii, the portion of Elfadel referred to by the Patent Office in the second

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paragraph is probably “In particular, for a given PULFD parameters, the smaller d , i.e., the shorter the line, the better the approximation.” Changing a parameter is not what is at issue; what is claimed in claim 17 is **“automatically selecting a macromodel based upon whether the length of the transmission line is less than or greater than the critical length.”** Elfadel does not teach or suggest this claimed subject matter.

Thus, claims 17-20 are allowable over the prior art of record.

The Patent Office is respectfully requested to reconsider and remove the rejections of the claims 1-13, 15-17, 19, and 20 under 35 U.S.C. 103(a) based on Elfadel in view of Roychowdhury, and to allow all of the pending claims 1-20 as now presented for examination. An early notification of the allowability of claims 1-20 is earnestly solicited.

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Respectfully submitted:

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